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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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10/797,784

03/10/2004

Anant Achyut Setlur

GLOZ 2 00169 (RD29342)

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07/13/2006

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EXAMINER

MONDT, JOHANNES P

ART UNIT

PAPER NUMBER

3663

DATE MAILED: 07/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/797,784

Applicant(s)

SETLUR ET AL.

Examiner

Johannes P. Mondt

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 12-21, 25-34, 38-40 and 43-45 is/are rejected.
- 7) ☒ Claim(s) 9-11, 22-24, 35-37, 41 and 42 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2/27/6.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination ("RCE") under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/24/06 has been entered.

### ***Response to Amendment***

Amendment filed 4/24/06 with said RCE forms the basis for this office action. In said Amendment applicants substantially amended all claims through substantial amendment of independent claims 1, 14 and 27 and through substantial amendments of the further limitations defined by dependent claims 13, 26, 39, 43 and 44. Comments on Remarks submitted with said Amendment are included below under "Response to Arguments".

### ***Information Disclosure Statement***

The examiner has considered the item listed in the Information Disclosure Statement filed 2/27/06. A signed copy of Form PTO-1449 has been enclosed with this action.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. **Claims 13, 26 and 39** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

In particular, the one or more additional phosphors to be selected from the group consisting of the phosphors enumerated in claim 13, 26 and 39 have not been distinguished in the specification to be preferably over the ones originally also included therein. Said group thus constitutes a sub-range undisclosed in the specification and as such constitutes new matter.

2. **Claim 44** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The claim contains subject matter not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. In particular, the claimed phosphor composition comprising *the specific combination* of all four of the phosphors as recited in claim 44 has not been disclosed in the specification. What is disclosed is substantially broader than what is claimed here, as witnessed by the disclosure of the lists of red, green and blue phosphors on pages 11-12.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. ***Claims 1-7, 12-13 and 45*** are rejected under 35 U.S.C. 102(b) as being anticipated by Srivastava et al (WO 01/89001 A2, with publication date of 22 November 2001).

*On claim 1: Srivastava et al teach a lighting apparatus for emitting white light comprising:*

*a semiconductor light source 11 or 1; see Figures 2-5 and 7) having a peak emission in a range from 370 nm – 390 nm (because this range is completely within the UV range; see “1. The Radiation Source”, pages 10-11, especially line 7 of page 11), and*

*a phosphor composition radiatively coupled to the light source (see pages 11-20), the phosphor composition comprising (Ba,Sr,Ca)<sub>2</sub> SiO<sub>4</sub>:Eu (see “3. Second Phosphor”, pages 13-15, especially 13, lines 20-26).*

*On claim 2: the light source is an LED (page 11, first paragraph).*

*On claim 3: the LED active region may comprise a p-n junction comprising GaN, AlGaN and InGaN semiconductor layers (page 11, first paragraph), hence said p-n junction can be characterized as an In<sub>i</sub>Ga<sub>j</sub>Al<sub>k</sub>N layer with 0 ≤ i, 0 ≤ j; 0 ≤ k, i+j+k=1.*

*On claim 4:* the lighting apparatus by Srivastava is also disclosed as an organic emissive structure, in particular: OLED (page 11, second paragraph).

*On claim 5:* the phosphor composition is coated on the surface of the light source (coating 46; see page 24 and Figure 7).

*On claim 6:* the lighting apparatus further comprises an encapsulant 19 surrounding the light source 11 and the phosphor composition 21 (pages 22-23 and Figure 4).

*On claim 7:* the phosphor is dispersed in the encapsulant (Figure 4 and loc.cit.).

*On claim 12:* said phosphor composition further comprises one or more additional phosphor(s) (see "2. First Phosphor", pages 11-12; "4. Third Phosphor", pages 15-18; and " 5. Optional Fourth Phosphor", pages 18-19).

*On claim 13:* said one or more additional phosphors are selected from the claimed group, for instance (Ba,Sr,Ca)MgP<sub>2</sub>O<sub>7</sub>:Eu<sup>2+</sup>,Mn<sup>2+</sup>. See page 12, lines 5-9).

*On claim 45:* said semiconductor light source has a peak emission at about 405 nm (namely: in the ranger 370 nm – 390 nm).

3. **Claims 1-3, 5-8, 12-13 and 45** are rejected under 35 U.S.C. 102(b) as being anticipated by Bokor et al (WO 02/11214; publication date = February 7, 2002) (Bokor et al (US 2004/0056256 A1), family member thereof, is used below for translation).

*On claim 1:* Bokor et al teach a light-emitting apparatus capable of producing white light ([0001], [0008],[0011], [0027]-[0029], Figure 1 and Table 4) comprising: a semiconductor light source 1 ([0027]) emitting radiation having a peak emission in the

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UV range (370 nm as peak wavelength is in the UV part of the spectrum; see abstract and [0008] and [0027]-[0029]) and a phosphor composition 6 ([0027]) radiationally coupled to the light source ([0008] and [0027]-[0029] and Table 4), the phosphor composition comprising  $(\text{Sr}, \text{Ba}, \text{Ca})_2\text{SiO}_4:\text{Eu}$  (item 14 in Table 4; for zero content of Ca, explicitly included in the definition according to applicants' admission; see page 13 of Remarks submitted with Amendment filed 10/3/05).

*On claim 2:* the lighting apparatus is an LED (title).

*On claim 3:* the LED comprises a nitride compound semiconductor represented by the formula  $\text{In}_i\text{Ga}_j\text{Al}_k\text{N}$ ,  $0 \leq k$ , and  $i+j=k$ . See [0013]).

*On claim 5:* the phosphor composition is coated on the surface of the light source (the coating being 5 comprising 6 ([0027])).

*On claim 6:* the lighting apparatus further comprises an encapsulant 5 ([0027]) surrounding the light source 1 and the phosphor composition 6.

*On claim 7:* the phosphor composition is dispersed in the encapsulant (Figure 1 and [0027]).

*On claim 8:* the lighting apparatus further comprises a reflector cup (see Figure 1, and reflecting walls 17 ([0027])).

*On claim 12:* said phosphor composition further comprises necessarily at least one additional phosphor because inclusion of  $(\text{Sr}, \text{Ba})\text{SiO}_4:\text{Eu}^{2+}$  needs to be combined with at least one phosphor in the blue portion of the emission spectrum ([0028] and [0032]).

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*On claim 13:* said one or more additional phosphors are selected from the blue-emitting phosphors 2, 4 and 6 in Table 4, inter alia:  $(\text{Ba,Sr,Ca})_5(\text{PO}_4)_3(\text{Cl,F,Br,OH}):\text{Eu}^{2+}$  (No.2 in Table 4, for zero content of Ca and the selection of Cl), and  $(\text{Ba,Sr,Ca})\text{MgAl}_{10}\text{O}_{17}:\text{Eu}^{2+},\text{Mn}^{2+}$  (for zero content of Ca and Mn).

*On claim 45:* said semiconductor light source has a peak emission at about 405 nm (namely: 370 nm) (see references in rejection of claim 1).

4. **Claims 27-33, 38 and 39** are rejected under 35 U.S.C. 102(b) as anticipated by Srivastava et al (WO 01/89001 A2).

*Srivastava et al teach:*

a semiconductor light source 11 or 1; see Figures 2-5 and 7) having a peak emission in a range from 370 nm – 390 nm (because this range is completely within the UV range; see “1. The Radiation Source”, pages 10-11, especially line 7 of page 11), and

a phosphor composition radiatively coupled to the light source (see pages 11-20), the phosphor composition comprising  $(\text{Ba,Sr,Ca})_2\text{SiO}_4:\text{Eu}$  (see “3. Second Phosphor”, pages 13-15, especially 13, lines 20-26) (see also above under 35 USC 102(b)); and

phosphor  $(\text{Sr,Mg,Ca,Ba,Zn})_2\text{P}_2\text{O}_7:\text{Eu,Mn}$  (see page 12, lines 5-14) as well as phosphor  $(\text{Ca,Sr,Ba,Mg})_5(\text{PO}_4)_3\text{Cl}:\text{Eu,Mn}$  (see “3. Third Phosphor”, page 16, second paragraph).

*On claim 28:* the light source is a semiconductor LED (page 11, first paragraph).



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*On claim 29:* the LED active region may comprise a p-n junction comprising GaN, AlGa<sub>j</sub>N and InGa<sub>i</sub>N semiconductor layers (page 11, first paragraph), hence said p-n junction can be characterized as an In<sub>i</sub>Ga<sub>j</sub>Al<sub>k</sub>N layer with  $0 \leq i$ ,  $0 \leq j$ ;  $0 \leq k$ ,  $i+j+k=1$ .

*On claim 30:* the lighting apparatus by Srivastava is also disclosed as an organic emissive structure, in particular: OLED (page 11, second paragraph).

*On claim 31:* the phosphor composition is coated on the surface of the light source (coating 46; see page 24 and Figure 7).

*On claim 32:* the lighting apparatus further comprises an encapsulant 19 surrounding the light source 11 and the phosphor composition 21 (pages 22-23 and Figure 4).

*On claim 33:* the phosphor is dispersed in the encapsulant (Figure 4 and loc.cit.).

*On claim 38:* said phosphor composition further comprises one or more additional phosphor(s) (see "2. First Phosphor", pages 11-12; "4. Third Phosphor", pages 15-18; and "5. Optional Fourth Phosphor", pages 18-19).

*On claim 39:* said one or more additional phosphors are selected from the claimed group, for instance (Ba,Sr,Ca)MgP<sub>2</sub>O<sub>7</sub>:Eu<sup>2+</sup>,Mn<sup>2+</sup>. See page 12, lines 5-9).

5. **Claim 27-29, 31-34 and 38-39** are rejected under 35 U.S.C. 102(b) as being anticipated by Bokor et al (WO 02/11214 A1).

*Bokor et al* teach a light-emitting apparatus capable of producing white light ([0001], [0008],[0011], [0027]-[0029], Figure 1 and Table 4) comprising: a semiconductor light source 1 ([0027]) emitting radiation having a peak emission in the UV range (370 nm as peak wavelength is in the UV part of the spectrum; see abstract

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and [0008] and [0027]-[0029]) and a phosphor composition 6 ([0027]) radiatively coupled to the light source ([0008] and [0027]-[0029] and Table 4), the phosphor composition comprising  $(\text{Sr}, \text{Ba}, \text{Ca})_2\text{SiO}_4:\text{Eu}$  (item 14 in Table 4; for zero content of Ca, explicitly included in the definition according to applicants' admission; see page 13 of Remarks submitted with Amendment filed 10/3/05); and one or more of the additionally recited phosphors in the claim, i.e., at least (see Table 3) the red phosphor  $\text{Sr}_2\text{P}_2\text{O}_7:\text{Eu}, \text{Mn}$  (which is included in the terminology  $(\text{Sr}, \text{Mg}, \text{Ca}, \text{Ba}, \text{Zn})_2\text{P}_2\text{O}_7:\text{Eu}, \text{Mn}$  (see explanation above).

*On claim 28:* the lighting apparatus is an LED (title).

*On claim 29:* the LED comprises a nitride compound semiconductor represented by the formula  $\text{In}_i\text{Ga}_j\text{Al}_k\text{N}$ ,  $0 \leq k$ , and  $i+j=k$ . See [0013]).

*On claim 31:* the phosphor composition is coated on the surface of the light source (the coating being 5 comprising 6 ([0027])).

*On claim 32:* the lighting apparatus further comprises an encapsulant 5 ([0027]) surrounding the light source 1 and the phosphor composition 6.

*On claim 33:* the phosphor composition is dispersed in the encapsulant (Figure 1 and [0027]).

*On claim 34:* the lighting apparatus further comprises a reflector cup (see Figure 1, and reflecting walls 17 ([0027])).

*On claim 38:* said phosphor composition further comprises necessarily at least one additional phosphor because inclusion of  $(\text{Sr}, \text{Ba})\text{SiO}_4:\text{Eu}^{2+}$  needs to be combined

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with at least one phosphor in the blue portion of the emission spectrum ([0028] and [0032])..

On claim 39: said one or more additional phosphors are selected from the blue-emitting phosphors 2, 4 and 6 in Table 4, inter alia:  $(\text{Ba}, \text{Sr}, \text{Ca})_5(\text{PO}_4)_3(\text{Cl}, \text{F}, \text{Br}, \text{OH}):\text{Eu}^{2+}$  (No.2 in Table 4, for zero content of Ca and the selection of Cl), and  $(\text{Ba}, \text{Sr}, \text{Ca})\text{MgAl}_{10}\text{O}_{17}:\text{Eu}^{2+}, \text{Mn}^{2+}$  (for zero content of Ca and Mn).

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 14-16, 18-21, 25 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bokor et al in view of Schaepkens et al (US 2004/0051444 A1) and either Lowden et al (cited in previous action) or Wyner et al (EP 0 087 745 A1). As detailed above, *Bokor et al* teach a light-emitting apparatus capable of emitting white light comprising:

a UV light source emitting radiation having a peak emission in the UV range and a phosphor composition radiatively coupled to the light source, the phosphor composition comprising  $(\text{Sr}, \text{Ba}, \text{Ca})_2\text{SiO}_4:\text{Eu}$  (see rejection over Bokor et al under 35 USC 102(b) overleaf).

*Bokor et al do not necessarily teach* the phosphor composition to also comprise one or more garnet phosphors and a magnesium fluorogermanate with formulae as claimed.

*However, it would have been obvious* to include said one or more garnet phosphors and magnesium fluorogermanate as claimed in view of Schaepkens et al, who, in a patent application on lighting apparatus (see title and abstract) including color conversion of primary light from light emitting apparatus (see [0037]-[0044]), hence analogous art, teach the inclusion of both a garnet phosphor having the general formula as claimed (see [0037]) for the specific purpose of absorption of the primary radiation including UV radiation at 390 nm (hence in the range around the peak wavelength of the light source of Bokor et al) and subsequent emission in the green-to-red portion of the spectrum, and a magnesium fluorogermanate ([0039]) for the purpose of absorption of the primary radiation in a range comprising the peak wavelength of Bokor et al (namely in a range from 300 nm to 500 nm; see [0037]) and subsequent emission of red light ([0039]). *Motivation* to include both the garnet and magnesium fluorogermanate phosphors immediately derives from the suitability of said phosphors for conversion of UV light to produce components in the spectrum supplementing the mainly blue-green component emitted by the  $(\text{Sr}, \text{Ba}, \text{Ca})_2\text{SiO}_4:\text{Eu}$  phosphor so as to approach white light, which is the common goal of the primary references (see Bokor et al, [0001]-[0002]).

*Neither of the above references necessarily teach* the specific formula for the magnesium fluorogermanate as claimed. *However, as witnessed for instance by*

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*Lowden et al or Wyner et al*, the selection of the specific magnesium fluorogermanate having the specific formula  $\text{Mg}_4\text{FGeO}_6\text{:Mn}$  has long been used as red phosphor, for the very purpose of down-conversion for which the magnesium fluorogermanate by *Schaepkens* is used. *Applicant is reminded that a prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art, as is the case here between the stoichiometric ratios between the atoms forming the germanium fluorogermanates, or when the ranges of a claimed composition do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. In re Peterson, 65 USPQ2d 1379 (CA FC 2003).

*On claim 15:* the lighting apparatus is an LED (title).

*On claim 16:* the LED comprises a nitride compound semiconductor represented by the formula  $\text{In}_i\text{Ga}_j\text{Al}_k\text{N}$ ,  $0 \leq k$ , and  $i+j=k$ . See [0013]).

*On claim 18:* the phosphor composition is coated on the surface of the light source (the coating being 5 comprising 6 ([0027])).

*On claim 19:* the lighting apparatus further comprises an encapsulant 5 ([0027]) surrounding the light source 1 and the phosphor composition 6.

*On claim 20:* the phosphor composition is dispersed in the encapsulant (Figure 1 and [0027]).

*On claim 21:* the lighting apparatus further comprises a reflector cup (see Figure 1, and reflecting walls 17 ([0027])).

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*On claim 25:* said phosphor composition further comprises necessarily at least one additional phosphor because inclusion of  $(\text{Sr}, \text{Ba})\text{SiO}_4:\text{Eu}^{2+}$  needs to be combined with at least one phosphor in the blue portion of the emission spectrum ([0028] and [0032])..

*On claim 26:* said one or more additional phosphors are selected from the blue-emitting phosphors 2, 4 and 6 in Table 4, inter alia:  $(\text{Ba}, \text{Sr}, \text{Ca})_5(\text{PO}_4)_3(\text{Cl}, \text{F}, \text{Br}, \text{OH}):\text{Eu}^{2+}$  (No. 2 in Table 4, for zero content of Ca and the selection of Cl), and  $(\text{Ba}, \text{Sr}, \text{Ca})\text{MgAl}_{10}\text{O}_{17}:\text{Eu}^{2+}, \text{Mn}^{2+}$  (for zero content of Ca and Mn).

**7. Claims 14-20, 25-26, 40 and 43** are rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava et al (WO 01/89001 A2) in view of Schaepkens et al (US 2004/0051444 A1) and either Lowden et al (cited in previous action) or Wyner et al (EP 0 087 745 A1).

On claims 14 and 40: As detailed above, Srivastava et al teach a semiconductor light source 11 or 1; see Figures 2-5 and 7) having a peak emission in a range from 370 nm – 390 nm (because this range is completely within the UV range; see “1. The Radiation Source”, pages 10-11, especially line 7 of page 11); and

a phosphor composition radiatively coupled to the light source (see pages 11-20), the phosphor composition comprising  $(\text{Ba}, \text{Sr}, \text{Ca})_2 \text{SiO}_4:\text{Eu}$  (see “3. Second Phosphor”, pages 13-15, especially 13, lines 20-26).

*Srivastava et al do not necessarily teach* the phosphor composition to also comprise one or more garnet phosphors and a magnesium fluorogermanate with formulae as claimed.

*However, it would have been obvious* to include said one or more garnet phosphors and magnesium fluorogermanate as claimed in view of Schaepkens et al, who, in a patent application on lighting apparatus (see title and abstract) including color conversion of primary light from light emitting apparatus (see [0037]-[0044]), hence analogous art, teach the inclusion of both a garnet phosphor having the general formula as claimed (see [0037]) for the specific purpose of absorption of the primary radiation including UV radiation at 390 nm (hence in the range around the peak wavelength of the light source of Srivastava et al) and subsequent emission in the green-to-red portion of the spectrum, and a magnesium fluorogermanate ([0039]) for the purpose of absorption of the primary radiation in a range comprising the peak wavelength of Srivastava et al. *Motivation* to include both the garnet and magnesium fluorogermanate phosphors immediately derives from the suitability of said phosphors for conversion of UV light to produce components in the spectrum supplementing the mainly blue-green component emitted by the  $(\text{Sr}, \text{Ba}, \text{Ca})_2\text{SiO}_4:\text{Eu}$  phosphor so as to approach white light, which is the common goal of the primary references (see Srivastava et al, "Background of the Invention", page 1).

*Neither of the above references necessarily teach* the specific formula for the magnesium fluorogermanate as claimed. *However, as witnessed for instance by Lowden et al or Wyner et al*, the selection of the specific magnesium fluorogermanate having the specific formula  $\text{Mg}_4\text{FGeO}_6:\text{Mn}$  has long been used as red phosphor, for the very purpose of down-conversion for which the magnesium fluorogermanate by Schaepkens is used. *Applicant is reminded that a prima facie case of obviousness*

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typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art, as is the case here between the stoichiometric ratios between the atoms forming the germanium fluorogermanates, or when the ranges of a claimed composition do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. In re Peterson, 65 USPQ2d 1379 (CA FC 2003).

Finally, the phosphor blend as recited by claim 40 is herewith also made obvious, because the combined invention implies the phosphor blend including  $(\text{Ba}, \text{Sr}, \text{Ca})_2 \text{SiO}_4:\text{Eu}$ ,  $\text{Mg}_4\text{FgeO}_6:\text{Mn}^{4+}$  and both the garnet phosphor having the general formula as claimed and the magnesium fluorogermanate having the claimed formula.

*On claim 15:* the light source is a semiconductor LED (page 11, first paragraph).

*On claim 16:* the LED active region may comprise a p-n junction comprising GaN, AlGaN and InGaN semiconductor layers (page 11, first paragraph), hence said p-n junction can be characterized as an  $\text{In}_i\text{Ga}_j\text{Al}_k\text{N}$  layer with  $0 \leq i$ ,  $0 \leq j$ ;  $0 \leq k$ ,  $i+j+k=1$ .

*On claim 17:* the lighting apparatus by Srivastava is also disclosed as an organic emissive structure, in particular: OLED (page 11, second paragraph).

*On claim 18:* the phosphor composition is coated on the surface of the light source (coating 46; see page 24 and Figure 7).

*On claim 19:* the lighting apparatus further comprises an encapsulant 19 surrounding the light source 11 and the phosphor composition 21 (pages 22-23 and Figure 4).

*On claim 20:* the phosphor is dispersed in the encapsulant (Figure 4 and loc.cit.).



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*On claim 25:* said phosphor composition further comprises one or more additional phosphor(s) (see "2. First Phosphor", pages 11-12; "4. Third Phosphor", pages 15-18; and "5. Optional Fourth Phosphor", pages 18-19).

*On claim 26:* said one or more additional phosphors are selected from the claimed group, for instance  $(\text{Ba}, \text{Sr}, \text{Ca})\text{MgP}_2\text{O}_7:\text{Eu}^{2+}, \text{Mn}^{2+}$ . See page 12, lines 5-9).

*On claim 43:* Srivastava's invention is using said phosphor blend to absorb radiation emitted by a light source with a peak emission in the UV range and emitting radiation that, when combined with said radiation from said light source produces white light (see "1. Radiation Source", page 10 final lines on primary source spectrum and "Background of the Invention", pages 1-4 on the overall production of white light).

8. **Claim 44** is rejected under 35 U.S.C. 103(a) as being unpatentable over

Srivastava et al (WO 01/89001 A2) in view of Admission by Applicant in their disclosure on equivalence of phosphors.

*Srivastava et al teach* the blue-green phosphor first listed in the claim as their "Second Phosphor" (page 13, final paragraph), the second phosphor listed in the claim as both one of their "Third Phosphor" (green phosphor) embodiments and as one of their blue phosphor embodiments (page 16), a magnesium fluorogermanate (page 31) closely related to the fourth phosphor listed in the claim for red phosphor, but do not necessarily teach the phosphor  $\text{Sr}_4\text{Al}_{14}\text{O}_{25}:\text{Eu}^{2+}$ . However, as admitted by Applicants in their disclosure, it would have been obvious to view  $\text{Sr}_4\text{Al}_{14}\text{O}_{25}:\text{Eu}^{2+}$  as an equivalent to  $(\text{Ba}, \text{Sr}, \text{Ca})_5(\text{PO}_4)_3(\text{Cl}, \text{F}, \text{OH}):\text{Eu}^{2+}, \text{Mn}^{2+}$  embodiments in view of the list presented on page 11 of the specification.

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Applicant is reminded in this regard that it has been held that mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. In re Leshin 125 USPQ 416.

### ***Allowable Subject Matter***

9. ***Claims 9-11, 22-24, 35-37 and 41-42*** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Strictly within the context of the inventions as defined by independent claims 1, 14, 27 and 40, the composition with the specific stoichiometric parameter values and cxx and ccy values have not been found in the prior art, nor are they obvious over the prior art.

### ***Response to Arguments***

Applicant's arguments filed 4/24/06 have been fully considered but they are, on the whole, not persuasive, although the Declaration under 37 CFR 1.131 has been accepted with reference to the Advisory Action. However, Srivastava et al (WO 01/89001 A2) (published November 22, 2001) and Bokor et al (WO 02/11214 A1) (published February 7, 2002) were found to meet most of the claims as amended.

In response to Remarks, the rejections under 35 USC 112 of claims 1-45 (ad 1) in the previous office action have been withdrawn in light of the amendment to the claim language. However, the rejections of claims 13, 26 and 39 are rejected under 35 USC 112, first paragraph for constituting new matter as a result of the amendment, as explained overleaf: the amendment to these claims constitutes a substantial narrowing of the range of phosphors disclosed *ex aequo* in the specification, and hence lacks support in the specification. The rejection under 35 USC 112, first paragraph, of claim 44 is maintained for the same reason: non-original claim 44 discloses a combination that is not disclosed to be preferable over any combination of red, green and blue phosphors disclosed in the specification *ex aequo* (pages 11-12). Furthermore, arguments in traverse over rejections based on Juestel are moot: Juestel (as the original Srivastava reference) is no longer relied upon in light of the Declaration under 37 CFR 1.131. The substantially amended claims have been examined at the earliest time possible.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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JPM  
July 3, 2006

Patent Examiner:



Johannes Mondt (Art Unit: 3663)